



US007974079B2

(12) **United States Patent**
Miller

(10) **Patent No.:** **US 7,974,079 B2**
(45) **Date of Patent:** **Jul. 5, 2011**

(54) **INTEGRATED MOUNTING SYSTEM FOR COMMUNICATION AND SURVEILLANCE INFRASTRUCTURES**

(75) Inventor: **Landon Miller**, Tuscaloosa, AL (US)

(73) Assignee: **International Business Machines Corporation**, Armonk, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 461 days.

(21) Appl. No.: **12/140,906**

(22) Filed: **Jun. 17, 2008**

(65) **Prior Publication Data**

US 2009/0310286 A1 Dec. 17, 2009

(51) **Int. Cl.**
H05K 7/20 (2006.01)

(52) **U.S. Cl.** **361/679.01; 361/679.02; 361/724; 361/725; 248/235; 135/88.13**

(58) **Field of Classification Search** None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,699,235	A *	10/1972	Wasson et al.	174/494
3,931,452	A *	1/1976	Nilsson	174/491
5,125,608	A *	6/1992	McMaster et al.	248/163.1
5,798,482	A *	8/1998	Reeves	174/2
5,816,443	A *	10/1998	Bustos	221/211
5,859,762	A	1/1999	Clark et al.	
6,111,189	A *	8/2000	Garvison et al.	136/244
6,350,135	B1 *	2/2002	Acklin et al.	439/211
6,397,869	B1 *	6/2002	Jennings	135/93
6,531,656	B1 *	3/2003	Grote et al.	174/491

6,535,382	B2 *	3/2003	Bishop et al.	361/690
6,675,934	B1 *	1/2004	McCormick	182/129
7,230,819	B2 *	6/2007	Muchow et al.	361/601
7,285,719	B2 *	10/2007	Conger	136/245
7,302,775	B2 *	12/2007	Olmsted	49/199
7,307,541	B2 *	12/2007	Ikeda et al.	340/815.4
7,703,466	B1 *	4/2010	Smith	135/91
7,749,380	B2 *	7/2010	Yungner et al.	210/143
7,756,667	B2 *	7/2010	Hamann et al.	702/130
7,811,159	B2 *	10/2010	Wilson et al.	454/119
2003/0036346	A1 *	2/2003	Wilson et al.	454/119
2004/0222336	A1 *	11/2004	Miller	248/130
2005/0033515	A1 *	2/2005	Bozzone	701/214
2005/0257861	A1 *	11/2005	Raos	148/592
2006/0137348	A1 *	6/2006	Pas	60/641.1
2006/0232412	A1 *	10/2006	Tabacman et al.	340/572.1
2006/0250755	A1 *	11/2006	Tilton et al.	361/600
2007/0134058	A1 *	6/2007	Meyer et al.	403/169
2007/0209694	A1 *	9/2007	Gooch et al.	135/91
2008/0068782	A1 *	3/2008	Muchow et al.	361/601
2008/0155915	A1 *	7/2008	Howe et al.	52/220.3
2008/0197664	A1 *	8/2008	Lowry et al.	296/100.18
2008/0197702	A1 *	8/2008	Banach	307/11

* cited by examiner

Primary Examiner — Jayprakash N Gandhi

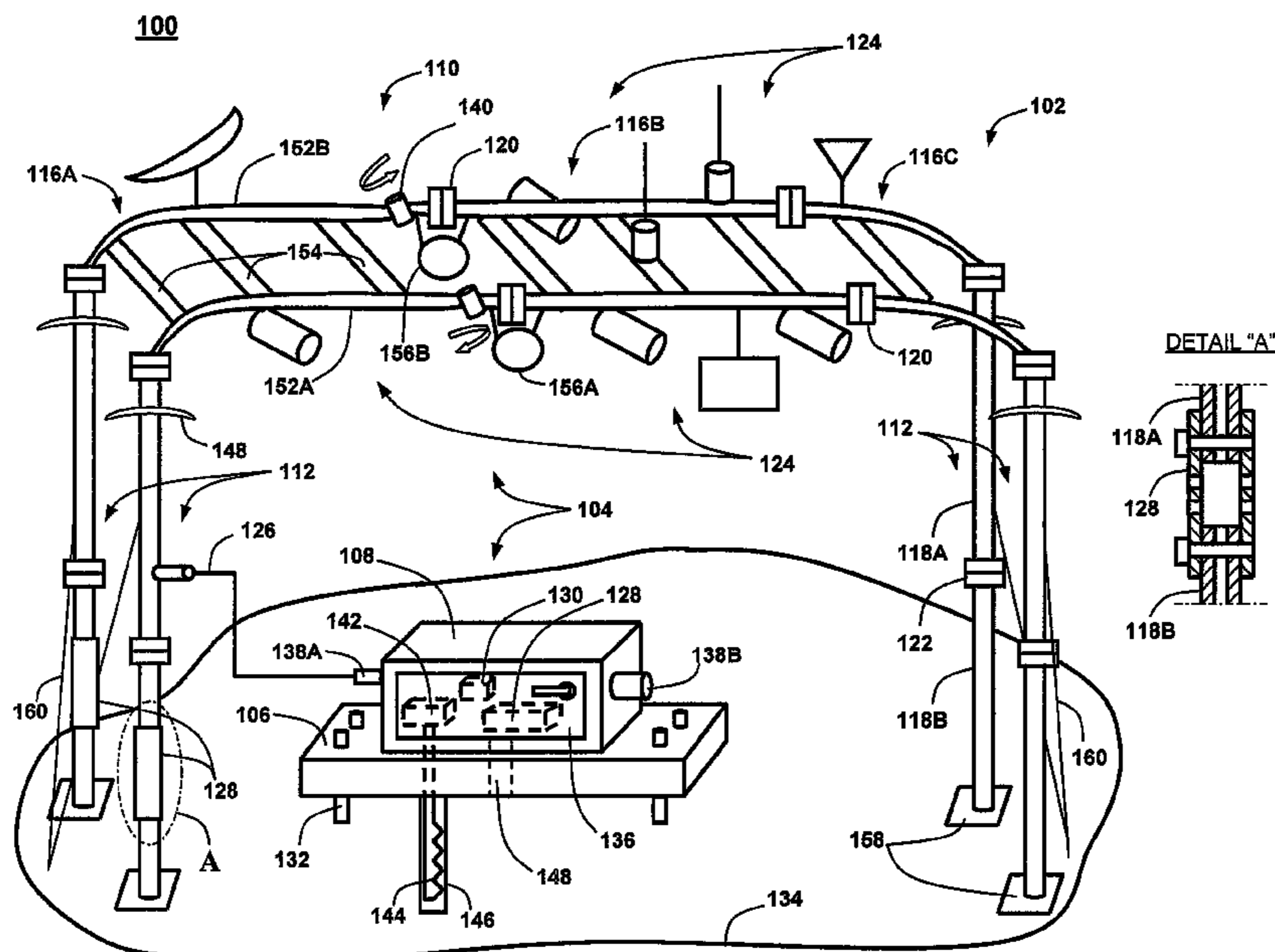
Assistant Examiner — Anthony Q Edwards

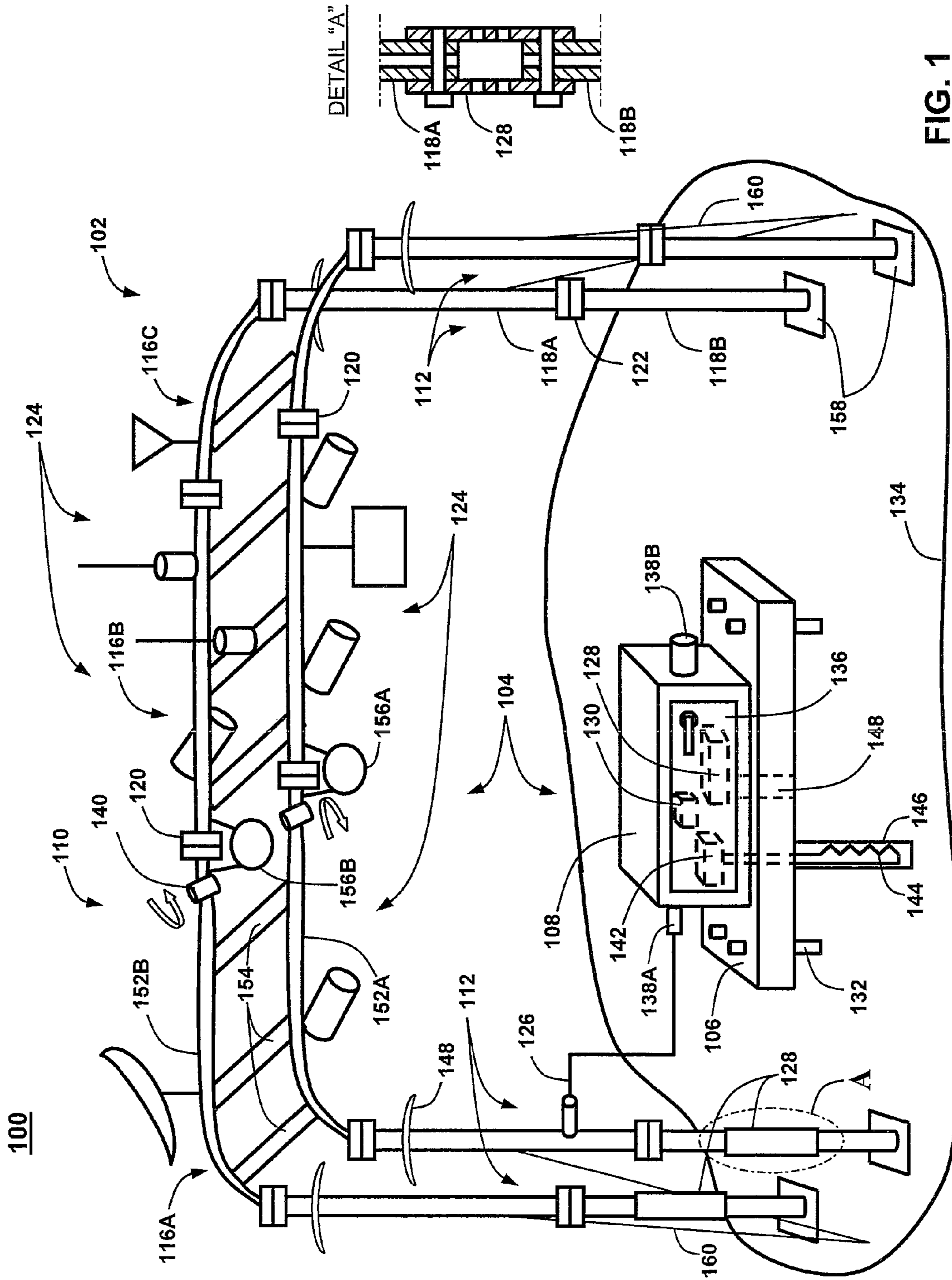
(74) *Attorney, Agent, or Firm* — Dillon & Yudell LLP

(57) **ABSTRACT**

An integrated mounting system for communication and surveillance infrastructures includes a gantry, a system cabinet, and an interconnecting conduit. The gantry includes a frame configured for housing functional devices (e.g., antennas, video cameras, sensors, photovoltaic panels, and the like) and supporting posts. The system cabinet contains electronic equipment of the functional devices and provides connectivity to land data networks and external sources of power. The system may be installed on a trailer and include autonomous sources of power.

20 Claims, 2 Drawing Sheets





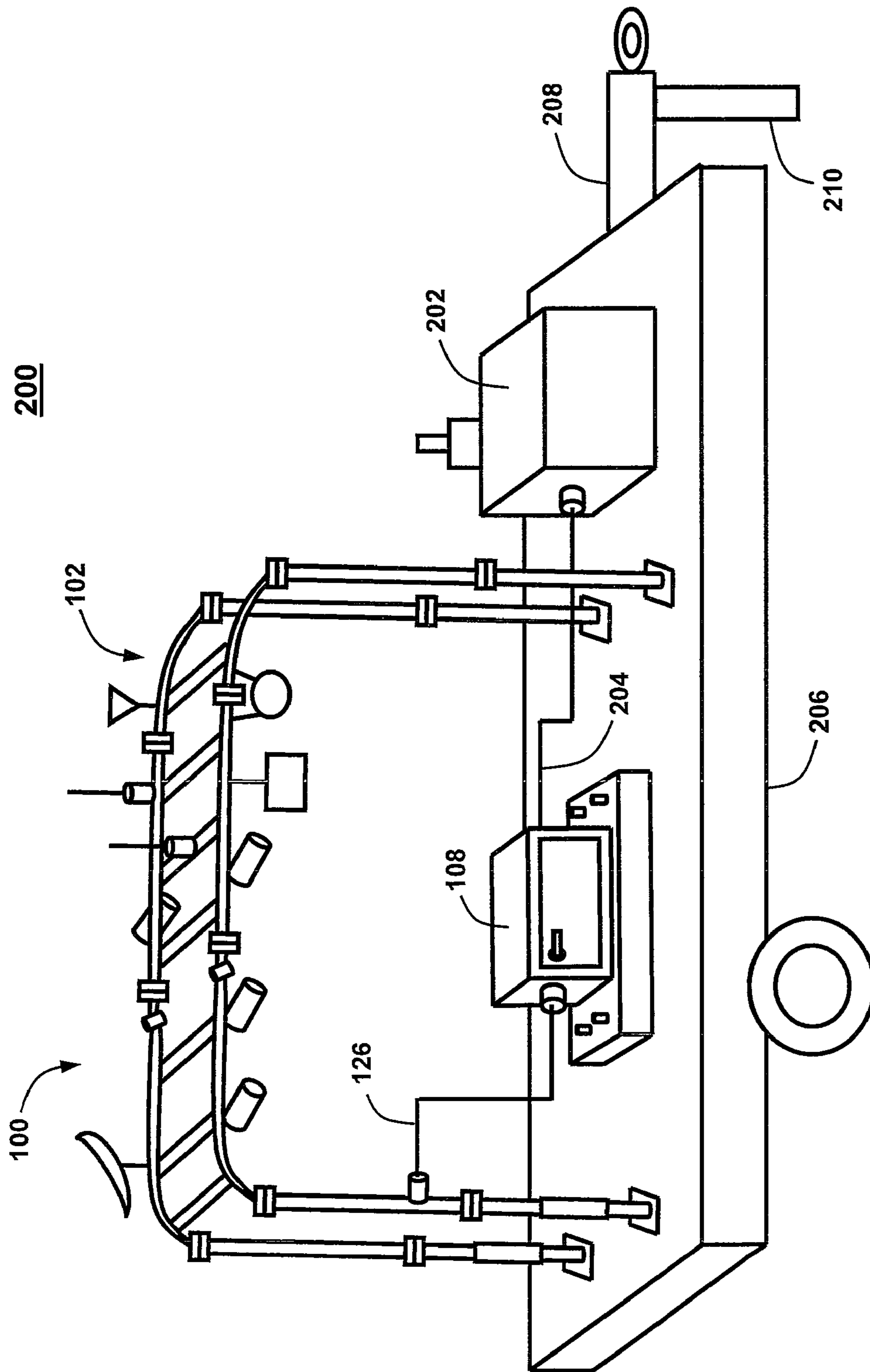


FIG. 2

1

INTEGRATED MOUNTING SYSTEM FOR COMMUNICATION AND SURVEILLANCE INFRASTRUCTURES

CROSS REFERENCE TO RELATED APPLICATION

This application relates to commonly assigned U.S. patent application Ser. No. 12/140,897, filed concurrently herewith and titled "Integrated Mounting System For Communication And Surveillance Infrastructures." The contents of which is incorporated herein by reference in its entirety.

BACKGROUND

1. Technical Field

The present invention generally relates to communication and surveillance infrastructures and, in particular, to techniques for providing access points and gateways to communication and surveillance infrastructures.

2. Description of the Related Art

Growing number and complexity of installations for networked communication and surveillance infrastructures have lead to a need in development of automatically operable semi-stationary and mobile field access points and gateways to these infrastructures.

Typically, access points and gateways adapted for installation in urban and countryside environments function within a framework of a single communication or surveillance network or a small number of such networks, which limits their effectiveness and increases operating and maintenance costs. Therefore, further improvements in the development of access points and gateways to communication and surveillance infrastructures are desirable.

SUMMARY OF ILLUSTRATIVE EMBODIMENTS

Disclosed is an integrated mounting system, which may be used in communication and surveillance infrastructures as a semi-permanent, temporary, and movable access point, gateway, terminal, or server for urban and countryside installations.

In embodiments of the present invention, the integrated mounting system comprises a gantry, a system cabinet, and an interconnecting conduit. The gantry includes a frame and posts, which support the frame in a pre-selected position. The frame is configured for housing functional devices, such as antennas, cameras, sensors and/or photovoltaic panels of various communicating, surveillance, and solar systems and apparatuses. The system cabinet generally contains electronic equipment of the functional devices, auxiliary subsystems (e.g., cooler, heater, etc.), and means of connectivity to land data networks and external sources of power. The conduit couples the electronic equipment to the functional devices and propagates through elements of the gantry. The system may be installed on a transportation platform (e.g., trailer) and include an autonomous source of electric power.

The above as well as additional features and advantages of the present invention will become apparent in the following detailed written description.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention itself will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

2

FIG. 1 depicts an integrated mounting system for communication and surveillance infrastructures, according to one embodiment of the invention.

FIG. 2 depicts a transportable integrated mounting system for communication and surveillance infrastructures, according to another embodiment of the invention.

DETAILED DESCRIPTION OF AN ILLUSTRATIVE EMBODIMENT

The illustrative embodiments provide an integrated mounting system for communication and surveillance infrastructures, in which the system may be used as a semi-permanent, temporary, and movable access point, gateway, terminal, or server.

In the following detailed description of exemplary embodiments of the invention, specific exemplary embodiments in which the invention may be practiced are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that mechanical, electrical, and other changes may be made without departing from the spirit or scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

Within the descriptions of the figures, similar elements are provided similar names and reference numerals as those of the previous figure(s), except that suffixes may be added, when appropriate, to differentiate such elements. The specific numerals assigned to the elements are provided solely to aid in the description and not meant to imply any limitations (structural or functional) on the invention.

It is understood that the use of specific component, device and/or parameter names are for example only and not meant to imply any limitations on the invention. The invention may thus be implemented with different nomenclature/terminology utilized to describe the components/devices/parameters herein, without limitation. Each term utilized herein is to be given its broadest interpretation given the context in which that term is utilized. Specifically, as utilized herein, the terms "functional devices" and "electronic equipment" broadly refer to electronic, wireless, and opto-electronic devices at least in part implementing communication and surveillance functions and operating within a framework of respective networks or independent therefrom.

With reference now to the figures, FIG. 1 depicts an exemplary integrated mounting system (IMS) **100** for urban and countryside installations according to one embodiment of the invention. IMS **100** generally includes gantry **102** and electronic equipment **104** and may be configured for automatic operation within a plurality of communication and/or surveillance infrastructures. In some embodiments (not shown), IMS system **100** may additionally include an optional autonomous source of electric power.

In one embodiment, gantry **102** comprises frame **110** and a plurality of posts **112** (four posts **112** are shown), and electronic equipment **104** includes system cabinet **108**, functional devices **124** disposed on frame **110**, and conduit **126** interconnecting electronic components disposed in system cabinet **108** and functional devices **124**.

Frame **110** may include one or more modules **116** (modules **116A-116C** are shown), which are detachably connected to one another and to posts **112**. Each module **116** generally includes arms **152** (arms **152A, 152B** shown in module **116A**) and a plurality of spaced apart shoulders **154**, which are connected to arms **152** in a fixed or detachable relationship.

Correspondingly, posts **112** may be unitary elements or comprise sections **118** (sections **118A** and **118B** are shown), which are detachably connected to one another. Illustratively, modules **116** and sections **118** are interconnected using flanges **120** and **122**, however, other types of couplings between modules **116** and sections **118** (for example, clamps) may be used in gantry **102**.

Sections **118** may be connected to one another in a fixed or length-adjustable relationship. In one exemplary embodiment, lengths of a portion of posts **112** are adjusted using sliding (or, alternatively, helical) couplings **128**. Illustratively, bottom sections **118** are provided with mounting shoes **158**. During an on-ground installation of gantry **102**, shoes **158** may be placed onto or be embedded in underlying foundation **134** (e.g., ground, gravel, concrete, etc.).

Some modules **116** may include joint couplings **140** that allow rotational movements of portions of IMS **100** relative to one another. For example, after disconnecting one of flanges **120** between modules **116A** and **116B**, a portion of gantry **102** including modules **116B** and **116C** and two posts **112** attached thereto may be rotated, about an axis of opposing joint coupling **140**, relative to the other portion of gantry **102**.

In exemplary embodiments, members of frame **110** and posts **112** thereof may be formed using, for example, pre-formed tubes having round or square cross-sections, T-shapes, I-beams, angle profiles, and the like structural elements fabricated from metals, fiberglass, composites, plastics, and combinations thereof.

Gantry **102** may also include (not shown) seals, gaskets, and covers adapted for preventing interior of the gantry from ingress of moisture or water, fixtures preventing unauthorized access to components of electronic equipment **104** or preventing climbing on posts **112** (anti-climbing dishes **148** are shown), as well as members adapted for securing and stabilizing gantry **102** (e.g., guy cables **160**), and the like auxiliary elements and devices.

Electronic equipment **104** generally includes (i) transceivers, video/voice/data processors, networking adapters (all collectively denoted with a reference numeral **128**) and external elements **124** thereof and (ii) power supplies, depleteable, rechargeable or fuel cell batteries, and other supporting apparatuses (all collectively denoted with a reference numeral **130**).

External elements **124** of electronic equipment **104** are mounted on members of frame **110**, and components **128** and **130** are disposed in system cabinet **108** and electrically connected to external elements **124** via conduit, or wiring, **126**. For monitoring the location of IMS **100** and protecting equipment **104** from theft or damage, components of electronic equipment **104** and/or system cabinet **108** may be provided with radio-frequency identification (RFID) sensors and/or sensors and interlocks traceable via the Global Positioning System (GPS).

External elements **124** generally include antennas (e.g., cellular, Wi-Fi, microwave, phased arrays, satellite, ZigBee, etc. antennas), video cameras, infra-red cameras, motion detectors, RFID sensors, high-frequency generators and receivers, and the like functional components of electronic, wireless, optical, and opto-electronic communication/surveillance systems and apparatuses. External elements **124** may also include solar devices (e.g., photovoltaic panels), wind generators, fuel cells, and other electrical generating elements that can be used as main, supplemental, or backup sources of electric power for components of electronic equipment **104**.

In one embodiment, system cabinet **108** is disposed proximate to gantry **102** and provided with a lockable door **136** and

at least one port **138** used as an entry point for conduit **126** and other incoming/outgoing power and signal cables (ports **138A**, **138B** are shown). For receiving in-ground power and/or signal cables, optional port **148** may be disposed in a bottom portion of system cabinet **108**.

System cabinet **108** is generally attached to and disposed on base plate **106** (for example, concrete, metal, or composite mounting plate), which is provided with fasteners **132** for affixing to underlying foundation **134** at a particular installation site. System cabinet **108** may include shelves, racks, guides, and the like elements providing mechanical support for the contents of the cabinet.

In the depicted embodiment, system cabinet **108** also comprises cooling unit **142** having heat-exchanging element **144** adapted for in-ground installation (as shown, in bore hole **146**). In alternate embodiments, system cabinet **108** may include other auxiliary sub-systems, such as thermoelectric coolers, fans, heaters, thermostats, dehumidifiers, and other climate-controlling devices.

In one embodiment, conduit **126** extends from system cabinet **108**, enters one of posts **112** (entry port **150** is shown) and propagates through openings in the post and members of modules **116** to reach, via arms **152** and shoulders **154** thereof, external elements **124** of electronic equipment **104**. Generally, arms **152** and shoulders **154** are adapted for concealing and protecting branches of conduit **126**. Portions of conduit **126** may also extend from arms **152** and form service loops **156**.

IMS **100** may at least partially be assembled prior to an on-site installation. For example, firstly, sections frame **110** and posts **112** of gantry **102** may be connected together. Then, after cables and component wires and cables of conduit **126** are coupled to components **128** and **130** of electronic equipment **104** inside system cabinet **108**, branches of conduit **126** are pulled through port **150**, post **112**, and arms **152** and shoulders **154** of frame **110** to mounting pads of external elements **124**. Installation of IMS **100** is completed after attaching base plate **106** and posts **112** to foundation **134** and connecting system cabinet **108**, via ports **138** and/or **148**, to on-site power/signal cables.

Referring to FIG. **2**, in another embodiment of the invention, an exemplary transportable integrated mounting system (TIMS) **200** comprises IMS **100**, optional electric power generator **202** coupled to IMS **100** via interconnecting cable **204**, and transportation platform **206**. IMS **100** and power generator **202** are attached to platform **206** and may be transported thereon by motorized vehicles, such as cars, trucks, or tractors.

Transportation platform **206** is generally a flat-bed trailer having hitch **208** for coupling to a transporting vehicle (not shown) and support **210**, which is used to stabilize the platform during periods of on-site installations. Generally, IMS **100** is operational when platform **206** is in a stationary position, however, in some embodiments, at least a portion of the functions of IMS **100** may be enabled on moving transportation platform **206**.

Power generator **202** is typically an autonomous source of electric power (e.g., diesel or gasoline engine/electric generator unit, replenishable fuel cell or the like), which is capable of powering IMS **100** and/or re-charging internal batteries thereof for extended durations of time. In some embodiments, power generator **202** serves as a main source of electric power for IMS **100**. In alternate embodiments, power generator **202** may be used as a backup power source, which complements on-site sources of electric power.

Those of ordinary skill in the art will appreciate that configurations depicted in FIGS. **1** and **2** may vary. For example,

5

other mechanical, electrical, electronic, optical, or photovoltaic components may be used in addition to or in place of the depicted components and devices. Therefore, the architectures depicted in FIGS. 1 and 2 are basic illustrations of IMS 100 and TMS 200, for which actual implementations may vary. Thus, the depicted examples are not meant to imply structural or architectural limitations with respect to the present invention.

While the invention has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular system, device or component thereof to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiments disclosed for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims. Moreover, the use of the terms first, second, etc. do not denote any order or importance, but rather the terms first, second, etc. are used to distinguish one element from another.

What is claimed is:

1. An integrated mounting system for communication/surveillance infrastructures, the system comprising:

a gantry including (i) a frame configured for housing functional devices of said infrastructures and (ii) a plurality of posts supporting the frame in a pre-selected position; a system cabinet containing electronic equipment of the functional devices; and

a conduit interconnecting the electronic equipment and the functional devices;

wherein portions of the conduit are disposed in elements of the gantry; and

wherein the frame comprises a plurality of modules detachably connected to one another and having arms and shoulders that are generally adapted for concealing and protecting branches of the conduit.

2. The system of claim 1, wherein the functional devices include antennas, cameras, sensors and/or photovoltaic panels of communicating, surveillance, and/or solar systems and apparatuses of said infrastructures.

3. The system of claim 1, wherein at least one of the modules comprises a joint coupling allowing rotational movements of portions of said system relative to one another, and after disconnecting a flange between modules, a portion of the gantry including modules and two posts attached thereto may be rotated, about an axis of opposing joint coupling, relative to another portion of the gantry.

4. The system of claim 1, wherein the posts are detachably connected to the frame and the posts comprise sections detachably connected to one another in a fixed or length-adjustable relationship.

5. The system of claim 1, wherein the system cabinet comprises at least one port for cables coupling the system to external sources of electric power and/or land data networks of said infrastructures.

6. The system of claim 1, wherein the system cabinet further contains a cooling unit having a heat-exchanging element adapted for in-ground installation.

7. The system of claim 1, wherein the portions of the conduit and/or a wiring raceway thereof extend from the system cabinet, enter via an entry port into a post of the gantry and propagate through openings in the post and members of one or more modules to reach, via arms and shoulders of the modules, external elements of the electronic equipment,

6

wherein one or more portions of the conduit may extend from the arms and form service loops.

8. The system of claim 1, further including one or more of an internal and an external source of electric power, wherein the external elements include one or more of solar devices, such as photovoltaic panels, wind generators, fuel cells, and other electrical generating elements that can be used as main, supplemental, or backup sources of electric power for components of the electronic equipment.

9. The system of claim 1, further comprising components adapted for providing water tightening of the gantry and/or the system cabinet.

10. The system of claim 1, further comprising components adapted for securing the system cabinet and/or the gantry to supporting foundations thereof.

11. The system of claim 1, further comprising a platform adapted for transporting and/or housing said system.

12. The system of claim 1, wherein the gantry includes: seals, gaskets, and covers adapted for preventing an interior of the gantry from ingress of moisture or water; fixtures preventing unauthorized access to components of electronic equipment; and fixtures preventing climbing on posts, including anti-climbing dishes; and members adapted for securing and stabilizing the gantry.

13. The system of claim 1, wherein components of the electronic equipment and/or the system cabinet are provided with one of radio-frequency identification (RFID) sensors and/or sensors and interlocks traceable via the Global Positioning System (GPS) utilized for monitoring a location of the system and for protecting the electronic equipment from theft or damage.

14. An integrated mounting system for communication/surveillance infrastructures, the system comprising:

a gantry having (i) a frame configured for housing functional devices including antennas, cameras, sensors and/or photovoltaic panels of communicating, surveillance, and solar systems and apparatuses of said infrastructures and (ii) four posts supporting the frame in a substantially horizontal position;

a system cabinet containing electronic equipment of the functional devices; and

a conduit interconnecting the electronic equipment and the functional devices;

wherein portions of the conduit are disposed in elements of the gantry; and

wherein the frame comprises a plurality of modules detachably connected to one another and having arms and shoulders that are generally adapted for concealing and protecting branches of the conduit.

15. The system of claim 14, wherein:

the frame comprises a plurality of modules detachably connected to one another, at least one of said modules having couplings allowing rotational movements of portions of said system relative to one another, wherein after disconnecting a flange between modules, a portion of the gantry including modules and two posts attached thereto may be rotated, about an axis of opposing joint coupling, relative to another portion of the gantry;

at least a portion of said posts comprises sections detachably connected to one another in a fixed or length-adjustable relationship;

the system cabinet comprises at least one port for cables coupling the system to external sources of electric power and/or land data networks of said infrastructures;

the system cabinet contains a cooling unit having a heat-exchanging element adapted for in-ground installation; and

7

portions of the conduit and/or a wiring raceway thereof are disposed in elements of the gantry.

16. The system of claim **15**, wherein the portions of the conduit and/or a wiring raceway thereof extend from the system cabinet, enter via an entry port into a post of the gantry and propagate through openings in the post and members of one or more modules to reach, via arms and shoulders of the modules, external elements of the electronic equipment, wherein one or more portions of the conduit may extend from the arms and form service loops.

17. The system of claim **14**, further comprising:
 components adapted for providing water tightening of the gantry and the system cabinet;
 components adapted for securing the system cabinet and/or the gantry to supporting foundations thereof; and
 internal or external sources of electric power, wherein the external elements include one or more of solar devices, such as photovoltaic panels, wind generators, fuel cells, and other electrical generating elements that can be used

8

as main, supplemental, or backup sources of electric power for components of the electronic equipment.

18. The system of claim **14**, further comprising a platform adapted for transporting and/or housing said system.

19. The system of claim **14**, wherein the gantry includes: seals, gaskets, and covers adapted for preventing an interior of the gantry from ingress of moisture or water; fixtures preventing unauthorized access to components of electronic equipment; and fixtures preventing climbing on posts, including anti-climbing dishes; and members adapted for securing and stabilizing the gantry.

20. The system of claim **14**, wherein components of the electronic equipment and/or the system cabinet are provided with one of radio-frequency identification (RFID) sensors and/or sensors and interlocks traceable via the Global Positioning System (GPS) utilized for monitoring a location of the system and for protecting the electronic equipment from theft or damage.

* * * * *